

Fact Sheet  
For Proposed Permit Limits (Permit Renewal)

Permittee:	City of Bozeman
Permit No.:	MT0022608
Receiving Water:	East Gallatin River
Facility Information:	Bozeman Wastewater Treatment Plant
Mailing Address:	255 Moss Bridge Road Bozeman, MT 59718
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Fee Information:	
Type:	Publicly Owned Treatment Works, Major
Number of Outfalls:	1 (For Fee Determination only)
Outfall - Type:	001 – Plant Discharge

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## **I. Permit Status**

The City of Bozeman, Pollution Discharge Elimination System(MPDES) permit was issued becoming effective on April 1, 1997 and expired November 30, 2000. The City has applied for a renewal of their permit on May 4, 2000, which is 180 days in advance of the permit's expiration date.

The Montana Department of Environmental Quality (Department) received a supplemental application Form 2A, on December 18, 2002. Included with the Form 2A were facility maps and flow diagrams. These documents were reviewed pursuant to ARM 17.30.1322 and were declared complete on January 6, 2003.

## **II. Facility Information**

### **a. Facility Description**

The Bozeman Wastewater Treatment Plant (WWTP) is a major municipal facility that serves a population of approximately 31,600 people. The WWTP is considered to be a secondary treatment plant with a design flow of 5.78 mgd.

The current treatment consists of primary sedimentation and secondary treatment utilizing complete mix, activated sludge with fine bubble aeration. Currently the facility disinfects its effluent with chlorine and de-chlorinates with sulfur dioxide. Eighteen Infiltration/Percolation (I/P) ponds were incorporated in the original design for additional ammonia removal. The facility is able to fully nitrify in the secondary treatment portion and has not needed the I/P cells to meet permit limits for ammonia.

The I/P cells (previously denoted as outfall 002) have an underdrain collection system that collects and routes wastewater to Outfall 001. The I/P cells were not designed with a definable liner below the collection system. This design may result in a discharge to groundwater which was not authorized in the previous permit. Therefore the I/P cells will not be used as a normal part of the treatment process, and will only be used to accept waste water in the case of emergency upset situations. The characterization and identification of information to determine the groundwater outfall will be included as a compliance schedule in Part IX of this fact sheet.

The facility discharges treated effluent from the secondary treatment process and any waste water collected from the I/P cells to the East Gallatin River. In the fall of 2003, the facility upgraded the outfall structure from an open ditch to a culvert to prevent erosion and sedimentation into the receiving water.

Biosolids are treated in anaerobic digesters. Treated biosolids are stored in a storage basin and then injected on local agricultural land during the months of June, July, and August; approximately 380 dry tons of biosolids accumulate each year.

Table 1 contains a summary of the Bozeman WWTP design criteria including factors based on hydraulics, biological activity and miscellaneous design parameters.

<b>Table 1. Current Design Criteria Summary (Source: CPE July 2004)</b>	
Facility Description: Complete mix, activated sludge with fine bubble aeration, with chlorination/dechlorination facilities.	
Construction Date: 1970	Modification Date: 1982
Design Population: 36,062	Current Population: Equivalent 31,600
Design Flow, Average (mgd): 5.78	Design Flow, Maximum Day (mgd): NA
Primary Treatment: Trash and Grit removal, and Primary sedimentation	Secondary Treatment: Activated sludge with aeration
Design BOD Removal (%): 85	Design BOD Load (lb/day): 8,574
Design SS Removal (%): 85	Design SS Load (lb/day): 7,219
Influent Flow (mgd): 4.51	Source: Facility
Collection System Combined [ ] Separate [ X ]	Estimated I/I: 27 gpcd
SSO Events (Y/N): none reported	Bypass Events (Y/N): no
Disinfection (Y/N): yes	Type: Chlorination/Dechlorination with plans to upgrade to UV
Discharge Method: Continuous	
Sludge Storage: Two Anaerobic digesters, 0.63 MG; two storage lagoons totaling 5.56 mgal	
Sludge Disposal: Land application	Permit Number: MTG650008 Subcategory 2.a.

Two comprehensive performance evaluations (CPEs) have been conducted by the Department at the Bozeman facility. The first was conducted in 1994 and the most recent in 2004. The most recent evaluation noted: “a significant reduction of approximately 50% of the infiltration and inflow (I/I) from the hydraulic loads noted in the 1994 CPE.” I/I have impacted the strength and the volume of the wastewater in the past. According to the facility’s permit application, an extensive I/I study was completed in 1999 and sewer rehabilitation work has been prioritized and is ongoing. These efforts appear to have been successful, as the significant changes in strength in volume of wastewater have been noted.

b. Compliance History

Based on a review of available information and effluent data during the term of the current permit, the Bozeman WWTP has remained in compliance with the permit conditions.

Four compliance inspections have been conducted in the last five-year permit cycle. No violations were noted during any of these inspections.

c. Effluent Characteristics

Effluent data are summarized in Appendix I, (Effluent Data Summary). These data are based on discharge monitoring reports (DMR) data for a five year period of record (POR) from January 1998 to November 2002. Form 2A permit application data for metals based on sampling conducted on November 18, 2002 are also summarized.

The Bozeman WWTP has performed acute toxicity testing as part of its current permit. The permittee currently performs testing every six months and alternates species between *Ceriodaphnia dubia* and *Pimephales promelas*. The facility has conducted eight WET tests from January 1999 through October 2002; and has passed all eight tests.

### III. Proposed Technology Based Effluent Limitations (TBEL)

a. Applicability to Technology Based Effluent Limits

Pursuant to ARM 17.30.1209, discharges from this facility must meet the requirements for secondary treatment limitations, as defined in 40 CFR 133 *et seq.*

Limits established in the previous permit were based on National Secondary Standards for CBOD<sub>5</sub>, TSS, Percent Removal, and pH, as required by 40 CFR 133.102. These limits will be incorporated into the renewed permit.

b. Proposed TBELs

**Table 2. Proposed Secondary Treatment Requirements**

Parameter	Units	7-Day Average (1)	30-Day Average (1)	7-Day Average (lb/day)	30-Day Average (lb/day)
Five-day Carbonaceous Biochemical Oxygen Demand (2)	mg/L	40	25	1,928	1,205
Total Suspended Solids (2)	mg/L	45	30	2,169	1,446
pH	s.u.	6.0 – 9.0			
(1) See the definitions in Part I.A of the permit for explanation of terms.					
(2) The 30-day average percent removal shall not be less than 85% for these parameters.					

Calculations for the 7-day and 30-day mass loadings utilize the following equation:  
(lb/day) = [concentration](mg/L) x design flow (mgd) x 8.34 conversion factor

c. Nondegradation Allocated Loads

Non-degradation allocations for the Bozeman WWTP were determined for CBOD<sub>5</sub>, TSS, total nitrogen and total phosphorous in accordance with the *Guidelines for Calculating Nondegradation Load Limits for Existing POTW's Under Nondegradation Rules* in the previous permit.

Table 3. *Summary of Allocated Load Limits*, displays the calculated load allocations and a summary of the actual average load discharging from the facility. This data was generated from the self-monitoring data reporting requirements from the prior permit. Data used was from 1998 through 2002. Loads for CBOD<sub>5</sub>, TSS, TN, and TP were calculated using annual average monthly discharge flow rates and annual average monthly discharge concentrations from DMR report forms.

<b>Table 3. Summary of Allocated Load Limits</b>						
ALLOCATED LOAD VALUES		ACTUAL AVERAGE LOADS <sup>(1)</sup> (lb/day)				
Parameter	30-Day Average (lb/day)	1998	1999	2000	2001	2002 <sup>(2)</sup>
CBOD <sub>5</sub>	1,205	203	200	151	222	252
TSS	1,446	311	328	235	344	426
Total Nitrogen	1,010	543	635	602	679	588
Total Phosphorus	252	125	133	139	130	126
(1) Based on review of the discharge monitoring report (DMR) data for the facility.						
(2) Due to the analysis date, Decembers data was not included in the Calendar year 2002 data set.						

#### IV. Proposed Water-Quality Based Effluent Limitations (WQBEL)

- a. Receiving Water
  1. Water Use Classification

The water use classification for the East Gallatin River in the area of Bozeman WWTP discharge is classified as "B-2" according to the Montana Surface Water Quality Standards and Procedures (ARM 17.30.610(a)(i)). Class B-2 waters are to be maintained suitable for drinking culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply. The specific segment is described as the "East Gallatin River (mainstem) from Montana Highway No. 293 crossing about one-half mile north of Bozeman to Dry Creek about 5 miles east of Manhattan." The drainage basin is identified as basin 041H. There are three segments of the East Gallatin River composing this basin. The Bozeman WWTP dischargers to segment MT41H003\_020, the East Gallatin River from Bridger Creek to Reese Creek, which extends 14.6 Miles.

The East Gallatin River in the area of facility discharge is not listed as impaired on Montana's 2004 303(d) list.

Applicable water quality standards for pollutants to be evaluated are set in Appendix IIA, and IIIA. Several water quality standards for metals are based on an equation using hardness and pollutant-specific factors found in the Department *Circular DEQ-7*, (Feb. 2006).

## 2. Ambient Water Quality

In determining the ambient water quality dataset for the East Gallatin River upstream of the Bozeman WWTP, limited recent data were available. Thus, data from a variety of sources were used compiled to represent upstream ambient water quality. Data sources included:

- For pH, temperature, and ammonia, the 75<sup>th</sup> percentile concentrations were obtained from a March 29, 2001 statement of basis. These data were based on data collected by the Bozeman WWTP, but which were not available at the time of the preparation of this fact sheet. The POR is not known.
- For total residual chlorine, no data were available. Because chlorine rapidly dissipates, measurable upstream ambient water quality concentrations would only be found in the event of upstream contributors. There are no facilities within one mile that would contribute total residual chlorine and therefore an upstream concentration equal to zero is assumed.
- For fecal coliform, dissolved oxygen (DO), NO<sub>3</sub>+NO<sub>2</sub>, total N, and total P, data from a single date, September 3, 1997, were available based on data collected upstream of the Bozeman WWTP by the USGS. Data for TKN and NO<sub>3</sub>+NO<sub>2</sub> were also available from MDEQ sampling on February 22, 1990 at station 2740 upstream of the Bozeman WWTP.
- Hardness data were extremely limited. Thus, data from February 1973 through April 1984 were obtained from MDEQ sampling stations 2740 and 2939 in the East Gallatin River for use in determining a comparable downstream hardness.
- Current metals data were not available. Data collected at multiple locations in the East Gallatin River during the 1970s show analytical results for cadmium, lead, copper, and zinc generally at less than detection levels

Appendix IIA, and IIIA contains a summary of the data compiled to reflect ambient water quality.

## 4. Critical Low Flow

Pursuant to ARM 17.30.635(4), the use of the 7Q10 (7-day low flow with a 10 year return period or annual exceedance probability of 10%) upstream low flow when completing evaluations based on water quality. Near the point of discharge of the Bozeman WWTP, 7Q10 stream low flows were determined using data obtained from the following:

- USGS Gage Station 06048000 (East Gallatin River at Bozeman MT), located in the East Gallatin River one-half mile north of Bozeman and one-half mile upstream from Bridger Creek, was available for a POR from September 1, 1939 to September 30, 1961.

Utilizing the USGS's, Seasonal Flow Summary (2004), season flows for this station was used to determine critical flow rate for the following time periods; November through February - 20 cfs, March through June - 25 cfs, and July through October - 23 cfs. The same publication lists the annual 7Q10 as 19 cfs.

## 5. Applicable Water Quality Standards

### A. Surface Water Quality Standards

Pursuant to ARM 17.30.624(2), discharges to B-2 waters may not violate the specific water quality standards listed under ARM 17.30.324(2)(a through k). In addition, discharges are subject to ARM 17.30.635 through 17.30.637, 17.30.640, 17.30.641, 17.30.645, and 17.30.646.

### b. Basis for WQBEL

WQBELs must be developed for parameters of concern (POC) when there is a “reasonable potential” (RP) for the discharge to cause or contribute to an exceedance of water quality standards. In cases where there is adequate data to determine if the POC has a reasonable potential to exceed the applicable water quality standard, a conventional mass balance analysis is employed. Receiving water input parameters are based on estimated background water quality for the East Gallatin River (Appendix IIA, and IIIA,) and the estimated low flow (20, and 25 cfs). Input parameters for effluent are design flow ( $Q_E$ ) and estimated effluent quality ( $C_E$ ). Upper bound estimates of effluent quality will be approximated using the maximum value and a multiplier of 1.5.

$$C_{RP} = \frac{C_E Q_E + C_S Q_S}{Q_E + Q_S} \quad (eq. 1)$$

where:

$C_{RP}$  = receiving water concentration (RWC) after mixing, mg/L

$C_E$  = effluent concentration, upper bound estimate, Appendix I, mg/l

$C_S$  = RWC upstream of discharge, Appendix IIA, IIIA, mg/L

$Q_R$  = receiving water design low flow, 7-day, 10-year low flow (19 cfs).

$Q_E$  = effluent design flow (8.97cfs).

*(See Appendix IIB, and IIIB for actual values used in calculations for  $C_{RP}$ ,  $C_E$ ,  $C_S$ )*

Results of this analysis are given in Appendix IIB, and IIIB. For any POC, if the RWC ( $C_{RP}$ ) exceeds the applicable water quality standard ( $C_R$ ), then a WQBEL will be developed in the next section and included in the permit. This analysis indicates that WQBEL are required for the

following POC: chronic ammonia. For parameters in which insufficient data exists, additional monitoring will be required to generate a data set to characterize the effluent during the next permit renewal.

c. Proposed WQBEL/ WLA

1. Ammonia

Total ammonia limits are developed based on standards that account for a combination of pH, temperature of the receiving stream, the presence or absence of salmonid species, and the presence or absence of fish in early life stages. Because pH and temperature vary on a seasonal basis as do the presence or absence of fish in early life stages, calculations for the in-stream chronic and acute standard for ammonia are based on the equations as obtained from Circular DEQ-7. Determinations have been made to establish salmonid species and early life forms being present year around. Ammonia standards have been calculated and displayed in Appendix IIA, and IIIA. A chronic mixing zone will be granted for ammonia, but exceeding of the acute standard will not be allowed. Limits established in the permit will be based on the acute and chronic standards.

2. Escherichia coli

ARM 17.30.624(2)(i and ii) establishes standards for Escherichia coli bacteria in state waters classified as B-2. Standards are established based on the geometric mean during seasonal periods. During the April 1 through October 31 period, 126 colony forming units per 100 mL is defined as the instantiations maximum, and 252 colony forming units in 100 mL during a 30- day period. During the period from November 1 through March 31, 630 colony forming units per 100 mL is defined as the instantiations maximum and 1,260 colony forming units in 100 mL during a 30-day period. No mixing zone will be granted for pathogens in the effluent.

3. Total Residual Chlorine

Department circular DEQ-7 established numeric water quality standards for total residual chlorine. The chronic aquatic life standards listed in DEQ-7 is established at 0.011 mg/L. Currently the facility utilizes chlorine to disinfect their effluent stream, with dechlorination using sulphur dioxide prior to discharge. Limits will be established in the permit for total residual chlorine; no mixing zone will be granted.

4. Oil and Grease

ARM 17.30.637(1)(b) established narrative limitations for oil and grease in surface waters of the state. The narrative standard prohibitions for visible oil sheen will be inserted in the permit. Should a visible sheen be noted, the facility will be required to follow up with a grab sample to verify total oil and grease is below 10 mg/L. No mixing zone for oil and grease will be granted.

5. Whole Effluent Toxicity

ARM 17.30.637(2)(d) prohibits discharges to state waters that would create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life.



e.      **Mixing Zone**

In previous permits, the mixing zone for Outfall Sum was defined as from where the effluent enters the river to a point approximately 4,500 feet downstream to where Sypes Creek enters the East Gallatin River. Nearly instantaneous mixing has been granted to the Bozeman WWTP in previous permits, thereby resulting in the availability of 100% for the chronic, and human health low flows. However, data indicates that the mixing zone currently granted to the Bozeman WWTP is larger than would be established under current regulations. Furthermore, data indicates nearly instantaneous mixing is not being achieved in the receiving water.

To reconcile the differences between the currently permitted mixing zone to that which would be allowed pursuant to regulations [ARM 17.30.515(1)], an evaluation of site-specific data was conducted. A study entitled *Effluent Mixing Characteristics below Four Wastewater-Treatment Facilities in Southwestern Montana* (Cleasby and Dodge. 1997) referred to as the “study”, evaluated receiving water ambient mixing at the Bozeman WWTP outfall.

After review of ARM 17.30.516 (3) (a-d), the mixing zone at the Bozeman facility does not qualify for a standard mixing zone. Standard mixing zones may be granted for facilities that discharge less than 1 mgd, discharges to surface waters through the ground, or those facilities that have nearly instantaneous mixing. The study found that, based on cross-sectional sampling, nearly instantaneous mixing did not occur within two stream widths. Water quality profiles at transect B showed greater than 10% variability 100 feet from the outfall location.

After considering ARM 17.30.505 (1), the Department is allowing a source specific mixing zone (ARM 17.30.518) for ammonia. The mixing zone granted is for meeting the chronic ammonia standard; no acute mixing zone will be allowed. The mixing zone granted will be from the outfall location downstream 710 feet. Site specific conditions have been modeled using CORMIX to determine the chronic mixing zone length during low flow conditions.

**VI.      Final Effluent Limits**

a.      **Final Effluent Limits, Outfall 001**

Limitations affecting the treatment process are presented below. These limits will be in effect from the issuance date of this permit.

**Table 4. Final Effluent Limitations**

Parameter	Concentration, (mg/L) <sup>(1)</sup>			Load, (lb/day) <sup>(1)</sup>	
	Daily Maximum	30-Day Average	7-Day Average	7-Day Average	30-Day Average
5-Day Carbonaceous Biochemical Oxygen Demand (CBOD <sub>5</sub> )	NA	25	40	1,928	1,205
Total Suspended Solids (TSS)	NA	30	45	2,169	1,446
Escherichia coli (#/100 ml), April through October, geometric mean	252	126	NA	NA	NA
Escherichia coli (#/100 ml) November through March, geometric mean	1,260	630	NA	NA	NA
Total Residual Chlorine (TRC) <sup>(2)</sup>	0.011	NA	NA	NA	NA
Total Ammonia as N,	3.15	1.52	NA	NA	NA
(1) See the definitions in Part I.A of the permit for explanation of terms					
(2) Limits apply only if chlorine is used for disinfection purposes.					

Effluent pH shall remain between 6.0 and 9.0 unless a variation is due to natural biological processes. For compliance purposes, any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

The arithmetic mean of TSS or CBOD<sub>5</sub> for effluent samples collected in a period of 30 consecutive days shall not exceed 15% of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85% removal). This is in addition to the concentration limitations on TSS and CBOD<sub>5</sub>.

The instantaneous maximum limitation for Oil and Grease in any grab sample shall be 10 mg/L, (ARM 17.30.637(1)(b)).

There shall be no acute toxicity in the effluent (ARM 17.30.637(1)(d)).

Limits established for total residual chlorine (TRC) have been calculated in this permit (Maximum Daily Limitation of 0.011 mg/l). Based on the currently available technology, method detection limits for residual chlorine are 0.1 mg/l. Any sample with analytical results less than this amount (0.1 mg/l) will be considered in compliance with permit limitations for TRC.

The permit will require modification to include ground water limitations based on the compliance schedule items submitted by the permittee. The permittee shall not utilize the I/P beds as a unit process until such time limitations are established. The permittee can use the I/P beds during catastrophic events associated with the treatment plant. In the event that the I/P beds are used, effluent discharged through the underlying collection system will be required to meet the same effluent limitations as outfall 001.

## **VII. Monitoring Requirements**

The previous permit required monitoring at two locations. Outfall 001, which is located at the end of the chlorination/dechlorination basin, and Outfall 002 from the under drain collection system beneath the I/P cells. The combined effluent from Outfalls 001 and 002 reports to a 27" discharge structure and conveyed via a 600 foot culvert, where it discharges to the East Gallatin River as Outfall Sum.

During the permit renewal, the permittee applied for one surface water discharge location, Outfall 001. Outfall 001 will be located at the end of pipe where the discharge enters the East Gallatin River. Currently compliance monitoring is conducted at the discharge structure located at the outlet of the dechlorination basin. The facility is in the planning stages to move the compliance monitoring to a location on the 600 foot culvert to provide a comprehensive monitoring location for the facility. See Figure 1, for the new orientation of the facility.

Flow monitoring will be conducted at the following locations: Flows from the dechlorination basin will be combined with any flows reporting from the under drain collection system of the I/P beds. Continuous monitoring is currently in place at both locations. The permittee will report a combined 30-day average and daily maximum flow passing the new monitoring location.

### **a. Influent Monitoring**

Monitoring of the influent to the Bozeman treatment system will be conducted at the headworks of the treatment system prior to any return flows or process treatment (except grit removal). Sampling must reflect the nature and effect of the influent stream being sampled.

### **b. Effluent Monitoring, Outfall 001**

Monitoring of the effluent at the Bozeman facility will be conducted at the lift station wet well prior to pumping to the chlorine contact basin. Sampling must reflect the nature and effect of the effluent stream being sampled. Once the permittee has constructed and commissioned the proposed monitoring location, they must notify the Department prior to routine use.

### **c. Reporting Requirements**

#### **1. Discharge Loads**

Discharge loads will be calculated using the instantaneous flow rate corresponding to the effluent sampling event. The 7-Day Average (lb/day) will be the arithmetic mean of all calculated loads during a calendar week. The highest 7-Day Average calculated for the reporting period shall be recorded on the discharge monitoring report. The 30-Day Average (lb/day) will be the arithmetic mean of all calculated loads during the 30-day reporting period. Daily loads will be calculated using the following equations.

Parameter Concentration [mg/l] x Effluent Flow Rate (gpm) x 0.012, or

Parameter Concentration [mg/l] x Effluent Flow Rate (mgd) x 8.34

## 2. Percent removal

The percent removal shall be calculated using the following formula:

$$\% \text{ Removal} = \frac{[\text{Influent Concentration}] - [\text{Effluent Concentration}]}{[\text{Influent Concentration}]} \times 100\%$$

Where,

*% Removal* = Calculated % removal

*Influent Concentration* = Corresponding 30-Day Average influent concentration based on the analytical results of the reporting period.

*Effluent Concentration* = Corresponding 30-Day Average effluent concentration based on the analytical results of the reporting period.

## 3. 7-Day Average

The 7-Day Average is the arithmetic mean of all samples collected during a calendar week, as defined in Part I.A of the permit. If only one sample is collected during the calendar week it is considered the 7-day average. The highest 7-day average of the monitoring period will be recorded on the discharge monitoring report. In case where only one sample is collected during the entire monitoring period, that sample shall be reported as both the 30-day and 7-day averages.

## 4. 30-Day Average

The 30-day average is the arithmetic mean as defined in Part I.A of the permit. If only one sample is collected in the monitoring period it will be considered as the 30-day average and recorded as such on the discharge monitoring report.

## 5. Sampling Frequency

Collection of samples required during the monitoring period will reflect the nature and effect of the discharge. Parameters that list multiple samples shall collect representative samples during the discharge event. If a discharge event lasts longer than one calendar week, samples should be collected during individual calendar weeks. If a discharge lasts less than one week, samples

should be collected on individual days during the discharge event. If a discharge lasts less than one day, samples should be collected at the start and conclusion of the discharge event.

d. Whole Effluent Toxicity (WET) Requirements

WET limitations and testing are also prescribed in this permit. The Department and the EPA Region 8 policy, which indicates that for major municipal facilities with a ratio of low flow to design flow less than 10:1, once per quarter, two species, acute toxicity testing is required. Currently, the ratio of stream low flow to design flow is 2.4:1.

Currently, the Bozeman WWTP conducts acute WET testing every six months and alternates between species. EPA policy and the Department allows for the reduction of toxicity testing to a once per quarter frequency. Therefore, an increase in testing frequency to two species per quarter will be required. If no acute toxicity is observed for four consecutive calendar quarters, testing may be reduced to alternating one species quarterly testing.

e. Pretreatment Requirements

The Bozeman WWTP operates an approved pretreatment program. Therefore, conditions consistent with the requirements set out in ARM 17.30.14 are included in the permit.

f. Biosolids Requirements

The Bozeman WWTP is subject to EPA Region VIII general permit as well as Montana regulations. Therefore conditions consistent with the requirements set out in the EPA and Montana regulations for biosolids use and disposal are contained in the permit.

Monitoring Requirements Outfall 001				
Parameter	Unit	Sample Location	Sample Frequency	Sample Type <sup>1</sup>
Flow	mgd	Influent	Continuous	<sup>5</sup>
	mgd	Effluent	Continuous	<sup>5</sup>
5-Day Carbonaceous Biochemical Oxygen Demand (CBOD <sub>5</sub> )	mg/L	Influent	5/Week	Composite
	mg/L	Effluent	5/Week	Composite
	% Removal <sup>4</sup>	NA	1/Month	Calculated
	lbs/day	Effluent	1/Month	Calculated
Total Suspended Solids (TSS)	mg/L	Influent	5/Week	Composite
	mg/L	Effluent	5/Week	Composite
	% Removal <sup>4</sup>	NA	1/Month	Calculated
	lbs/day	Effluent	1/Month	Calculated
pH	s.u.	Effluent	Daily	Instantaneous
Temperature	°C	Effluent	Daily	Instantaneous
Escherichia coli Bacteria	No./100ml	Effluent	5/Week	Grab
Total Residual Chlorine <sup>2</sup>	mg/L	Effluent	Daily	Grab
Oil sheen	Presence	Effluent	Daily	Observation
Oil and Grease <sup>6</sup>	mg/L	Effluent	NA	Grab
Petroleum Hydrocarbons <sup>7</sup>	mg/L	Effluent	1/Quarter	Grab
Total Ammonia, as N	mg/L	Effluent	5/Week	Composite
Nitrate + Nitrite, as N	mg/L	Effluent	1/Week	Composite
Kjeldahl Nitrogen, Total, as N	mg/L	Effluent	1/Week	Composite
Total Nitrogen, as N <sup>3</sup>	mg/L	Effluent	1/Week	Calculated
	lbs/day	NA	1/Month	Calculated
Total Phosphorus, as P	mg/L	Effluent	1/Week	Composite
	lbs/day	NA	1/Month	Calculated
Total Dissolved Solids (TDS)	mg/L	Effluent	1/Month	Composite
Dissolved Oxygen	mg/L	Effluent	1/Week	Grab
Whole Effluent Toxicity, Acute <sup>4</sup>	% Effluent	Effluent	1/Quarter	Composite
<ol style="list-style-type: none"> <li>See Definition section at end of permit for explanation of terms.</li> <li>The Permittee is only required to sample for total residual chlorine if chlorine is used as a disinfectant in the treatment process. If chlorine is <i>not</i> used, write "NA" on the DMR for this parameter.</li> <li>Calculated as the sum of Nitrate + Nitrite (as N) and Total Kjeldahl Nitrogen (as N) concentrations.</li> <li>Acute test shall utilize Flathead Minnow (<i>Pimephales promelas</i>) the most recent version of EPA Method 2001.0 and <i>Ceriodaphnia dubia</i>, EPA Method 2002.0 or most current method, two species quarterly.</li> <li>Requires recording device or totalizer; permittee shall report daily maximum and daily average flow on DMR.</li> <li>Use EPA Method 1664, Revision A: N-Hexane Extractable Material (HEM), or equivalent. Required only when a visible sheen is observed.</li> <li>Use EPA Method 418.1, Infrared Spectroscopy.</li> </ol>				

Monitoring Requirements Outfall 001 (Continued)				
Parameter	Unit	Sample Frequency <sup>7</sup>	Sample Type <sup>1</sup>	ML
Antimony, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	1
Arsenic, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	1
Beryllium, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	1
Cadmium, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	0.1
Chromium, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	10
Copper, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	1
Lead, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	1
Mercury, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	0.1
Nickel, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	10
Selenium, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	1
Silver, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	1
Thallium, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	1
Zinc, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	10
Cyanide, Total	µg/L	2/Year	Grab	5
Phenols, Total	µg/L	2/Year	Grab	10
Hardness, Total (as CaCO <sub>3</sub> )	mg/L	2/Year	Grab	10
Volatile Organic Pollutants <sup>3</sup>	µg/L	2/Year <sup>5</sup>	Composite	<sup>6</sup>
Semi-Volatile, Acid Compounds <sup>4</sup>	µg/L	2/Year <sup>5</sup>	Composite	<sup>6</sup>
Semi-Volatile, Base Neutral <sup>4</sup>	µg/L	2/Year <sup>5</sup>	Composite	<sup>6</sup>
Footnotes: 1. See Definition section at end of permit for explanation of terms. 2. Metals shall be analyzed as total recoverable, use EPA Method (Section) 4.1.4 [EPA 600/4-79-020, March 1983] or equivalent. 3. 40 CFR 122, Appendix J, Table 2, use EPA Method 1624 Revision B, or equivalent. 4. 40 CFR 122, Appendix J, Table 2, use EPA Method 1625 Revision B, or equivalent. 5. Sampling required only in second and third calendar years after the effective date of the permit. This information will not be entered on the DMR form; a copy of the analytical laboratory report must be attached to the DMR for the applicable reporting period. 6. See approved method for minimum level (ML). 7. Samples must be collected in the first and third calendar quarters of the calendar year.				

i. Other Monitoring

No additional monitoring requirements are prescribed.

**II. Nonsignificance Determination**

As stated in ARM 17.30.702(16), a new or increased source excludes facilities that commenced or increased discharging prior to April 29, 1993, provided the discharge is in compliance with, and has not exceeded the limits established under a permit issued by the Department prior to April 29, 1993. Therefore, the discharge is not subject to Montana Nondegradation Policy [75-5-303 MCA] or nondegradation rules (ARM 17.30.Subchapter 7) as a new or increased source.

**IX. TMDL Status**

On September 21, 2000, a US District Judge issued an order stating that until all necessary total maximum daily loads (TMDLs) under Section 303(d) of the Clean Water Act are established for a particular water quality limited segment (WQLS), the State is not to issue any new permits or increase permitted discharges under the MPDES program. The order was issued under the lawsuit Friends of the Wild Swan vs. US EPA et al, CV 97-35-M-DWM, District of Montana, Missoula Division.

The Montana Water Quality Act authorizes the issuance of point source discharge permits on a listed water body pending completion of a TMDL provided that: 1) the discharge is in compliance with the provisions of 75-5-303, MCA (nondegradation policy); 2) the discharge will not cause a decline in the water quality of the parameter for which the water body is listed; and 3) the minimum treatment requirements are met as set out in 75-5-303(10), MCA.

The department finds that the renewal and re-issuance of this permit does not conflict with Judge Molloy's Order (CV97-35-M-DVM) because the receiving stream is not currently listed on the State's 303(d) list.

**X. Special Conditions/Compliance Schedules**

ARM 17.30.1432 requires permittees to furnish to the Department, within a reasonable time, information which the Department may request to determine compliance with this permit.

a. Description of Discharge Points and Mixing Zones: Based on the design of the I/P beds, effluent can infiltrate in the groundwater under the beds. To ensure compliance with the groundwater rules, the Department is requesting outfall designation for the groundwater contribution. The permittee shall request modification of the permit pursuant to the schedule presented below.

- i) Authority: ARM 17.30.1322(1), and 75-5-401(1) MCA, any person who discharges or proposes to discharge pollutants to state waters shall submit



application to the Department. Based on the current design of the I/P beds, effluent percolated through the bed may report to groundwater. As groundwater is defined as state waters 75-5-103 (29) MCA, an outfall designation must be included in the MPDES permit.

- ii) Schedule: By [DATE], the permittee will be required to submit design specifications, site, and effluent characterization for the groundwater outfall. The application for the groundwater outfall will be accompanied with the appropriate fees and shall request a modification to the permit. The specific information requested, is outlined in the February 2, 2005 letter to the city.

Until such time that the groundwater outfall is included in the permit; the facility may use the I/P beds on an emergency basis only. Routine use of the beds as a unit process will not be allowed. Effluent collected through the under drain system will be required to meet permit limitations contained under outfall 001.

b. Ambient Water Quality. The ambient water quality data used in the development of WQBELs are very limited and, in some cases, very old. To ensure the assumptions made in the permit development was prudent and reasonable to consider, upstream monitoring from the discharge will be required to characterize the receiving water.

- i. Authority: ARM 17.30.637(2), The Department will require the permittee to submit receiving water characteristics to confirm the discharge will not contribute to or cause exceedances of water quality standards.
- ii. Schedule: The Department has developed a minimum parameters list for characterizing the receiving water. Instream Monitoring Requirements list the parameters and frequency the instream monitoring will occur. Instream monitoring undertaken by the Bozeman WWTP shall follow the analytical procedures set forth in 40 CFR Part 136.

<b>Instream Monitoring Requirements</b>				
Parameter	Unit	Sample Frequency <sup>(4)</sup>	Sample Type <sup>(1)</sup>	ML <sup>(3)</sup>
pH, su	s.u.	1/Month	Grab	0.1
Total Ammonia, as N	mg/L	1/Month	Grab	0.05
Nitrate+ Nitrate, as N	mg/L	1/Month	Grab	0.05
Kjeldahl nitrogen as N	mg/L	1/Month	Grab	0.1
Total Nitrogen <sup>(5)</sup>	mg/L	1/Month	Grab	0.01
Total Phosphorous	mg/L	1/Month	Grab	0.001
Arsenic <sup>(2)</sup>	µg/L	1/Year	Grab	1
Cadmium <sup>(2)</sup>	µg/L	1/Year	Grab	0.1
Copper <sup>(2)</sup>	µg/L	1/Year	Grab	1
Lead <sup>(2)</sup>	µg/L	1/Year	Grab	1
Mercury <sup>(2)</sup>	µg/L	1/Year	Grab	0.1
Nickel <sup>(2)</sup>	µg/L	1/Year	Grab	5
Silver <sup>(2)</sup>	µg/L	1/Year	Grab	5
Zinc <sup>(2)</sup>	µg/L	1/Year	Grab	10
Footnotes: 1. See Definition section at end of permit for explanation of terms. 2. Metals shall be analyzed as total recoverable, use EPA Method (Section) 4.1.4 [EPA 600/4-79-020, March 1983] or equivalent. 3. See approved method for minimum level (ML). 4. Samples must be collected in the first and third calendar quarters of the calendar year. 5. Total Nitrogen as N, will be calculated from (Nitrate +Nitrite) + TKN				

In accordance with ARM 17.30.13423(11), all reports, plan or information submitted to the Department must be signed and certified in accordance with Part IV.G of the permit and ARM 17.30.1323. Legible copies of these reports shall be submitted to the Department at the following address:

Montana Department of Environmental Quality  
PCS Coordinator  
Water Protection Bureau  
PO Box 200901  
Helena, MT 59620-0901  
Phone (406) 444-3080

## **XI. Standard Conditions**

The standard conditions as set forth in ARM 17.30.1342 are included in the permit.

## **XII. Information Sources**

Clean Water Act (CWA), 33 U.S.C. 1251 *et seq.*

US Code of Federal Regulations, 40 CFR Part 122 -The National Pollutant Discharge Elimination System

US Code of Federal Regulations, 40 CFR Part 133 –Secondary Treatment Regulation

Montana Water Quality Act, MCA 75-5-101 *et seq.*

ARM Title 17, Chapter 30, Sub-chapter 13 - Montana Pollutant Discharge Elimination System (MPDES) Permits

ARM Title 17, Chapter 30, Sub-chapter 5 - Mixing Zones in Surface and Ground Water

ARM Title 17, Chapter 30, Sub-chapter 6 - Surface Water Quality Standards

ARM Title 17, Chapter 30, Sub-chapter 7 - Nondegradation of Water Quality

Circular DEQ-7 (February 2006), Montana Numeric Water Quality Standards

"Montana List of Waterbodies in Need of Total Maximum Daily Load Development," 303(d) list, dated 1996 and 2002

Technical Support Document for Water Quality-Based Toxics Control, EPA 50529001, March 1991

MPDES Permit Application Form 1 and 2A, received December, 2002

EPA, 1997; Region VIII NPDES Whole Effluent Toxics Control Program, EPA. August 1997.

Cleasby and Dodge, 1999. Effluent Mixing Characteristics below Four Wastewater-Treatment Facilities in Southwestern Montana, 1997, Report 99-4026. USGS. March 1999.

EPA, 2001; Local Limits Development Guidance, Draft, EPA, August 2001.

DEQ, Technical and Financial Assistance Bureau, Comprehensive Performance Evaluation Feb. 2005

Prepared by: J Lloyd, March 15, 2006

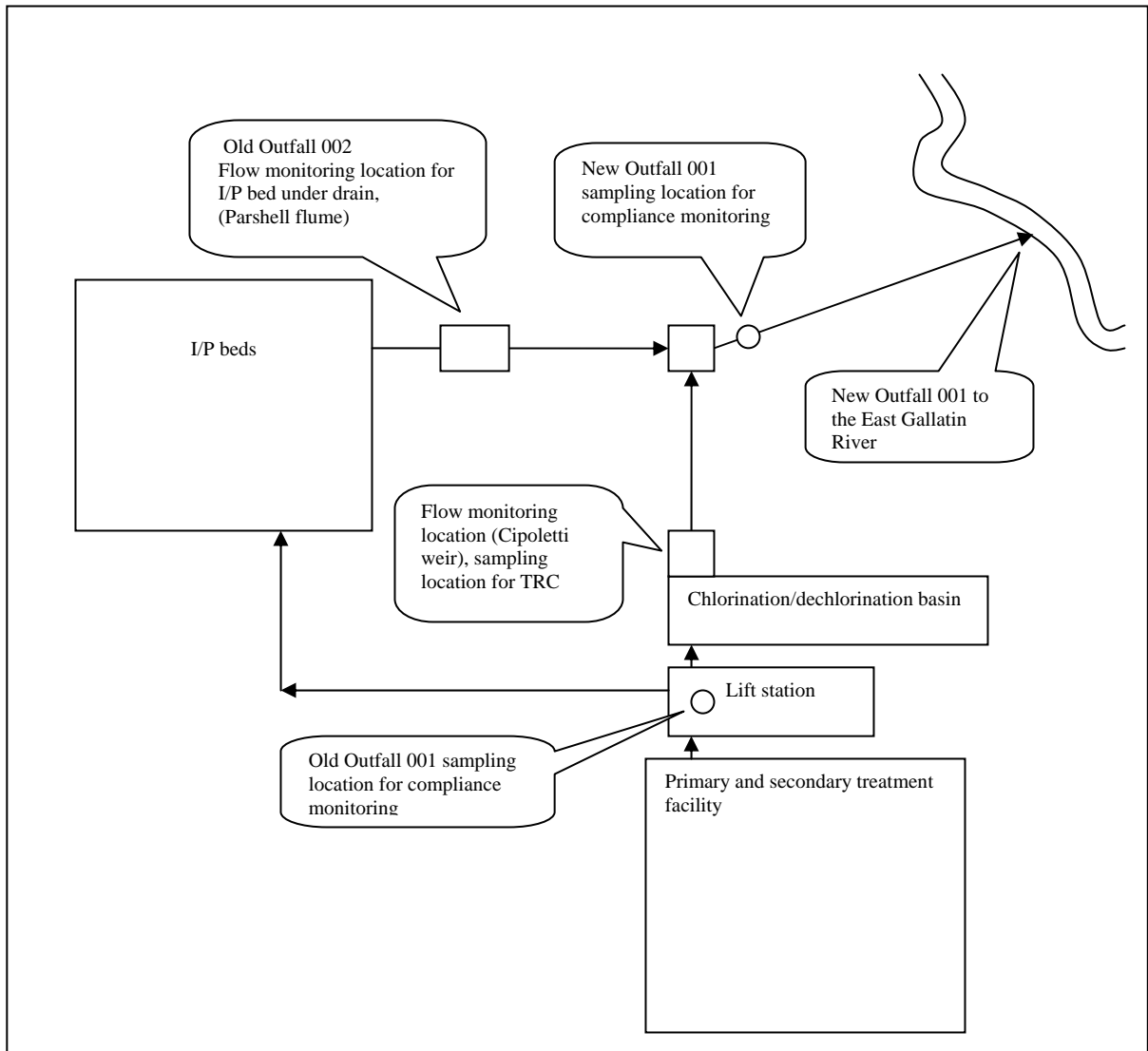


Figure 1, Facility Orientation and Monitoring Locations

## Appendix I. Effluent Characterization

Parameter, units	Sample Size		Mean Value	Minimum Value	Maximum Value	Variation Factor	Upper Bound Estimate	Source/Comment
<b>Physical/Descriptive Measurements</b>								
Temperature, degrees F	1		52					POR
Discharge, instantaneous, cfs	61		8.97	3.09	9.74			11/97 to 1/03
pH, standard units	118		7	6.5	7.9			DMR data
Suspended sediment, mg/L	59		12	2	32	1.5	48	
Total Residual Chlorine, mg/l	30		.00043	0.00	0.02	1.5	0.03	
<b>Organics -Aggregate</b>								
Carb. Biochemical Oxygen Demand, mg/L	59		5.3	2	9	1.5	13.5	
<b>Inorganic, Nonmetallic</b>								
Ammonia, mg/L, as N, Nov.-Feb.	59		.82	.056	5.7	1.5	8.55	
Ammonia, mg/L, as N, Mar.-Jun.	59		.55	.02	7.9	1.5	11.85	
Ammonia, mg/L, as N, Jul.-Oct.	59		.21	.024	1.4	1.5	2.1	
Nitrite plus nitrate, mg/L, as N	59		13	.05	21	1.5	31.5	
Total Nitrogen, mg/L	59		16	2	29	1.5	43.5	
Total Phosphorus, mg/L	59		3.4	2.3	4.9	1.5	7.35	
<b>Metals, Total Recoverable, unless specified</b>								
Arsenic, mg/L	1	<	0.005					insufficient data to estimate UBE
Beryllium, mg/L	1	<	0.001					
Cadmium, mg/L	6	<	.001					
Chromium, total, mg/L	6	<	.01					
Copper, mg/L	6		.013					
Lead, mg/L	6	<	0.01					
Mercury, mg/L	4	<	.001					
Nickel, mg/L	6	<	.01					
Selenium, mg/L	6	<	.005					
Silver, mg/L	6	<	.005					
Zinc, mg/L	6		.048					

(NA-Not Applicable; ND-No Data; UK-Unknown or cannot be determined).

Appendix II(A). Receiving Water Characterization, November through March

Parameter, units	Sample size	Receiving Water						Water Quality Standards
		<	Mean		Minimum		Maximum	
Physical/ Descriptive Measurements								
Temperature, F,Degrees	365		38.4		32		53.6	+1,-2
Discharge, instantaneous, cfs			20		23		56	
pH, minimum, field, standard units	455		8.1		7.2		9	6.7
Hardness, mg/L as CaCO3	11		180		102		232	
Total Residual Chlorine, mg/l	1		0		0		0	0.011
Inorganic, Nonmetallic								
Ammonia, mg/L, as N, chronic	205		0.032		0.027		0.036	1.52
Ammonia, mg/L, as N, acute	205		0.032		0.027		0.036	3.15
Nitrite plus nitrate, mg/L, as N	2		0.38		0.31		0.45	10
Total Nitrogen, mg/L	1		0.71					NA
Total Phosphorus, mg/L	1		0.038					NA
Metals, Total Recoverable, unless specified								
Arsenic, mg/L	1 <		0.003					0.018
Cadmium, mg/L	1 <		0.0001					0.00041
Chromium, total, mg/L	1 <		0.001					0.139
Copper, mg/L	1 <		0.001					0.015
Lead, mg/L,	1 <		0.003					0.0067
Mercury, mg/L	1 <		0.001					0.00005
Nickel, mg/L	1 <		0.02					0.085
Selenium, mg/L	1 <		0.001					0.005
Silver, mg/L	1		0.003					0.011
Zinc, mg/L	1 <		0.01					0.197

(NA-Not Applicable; ND-No Data; UK-Unknown or cannot be determined)

Ammonia std

**Freshwater Aquatic Life Standards for Total Ammonia Nitrogen in mg/L**

From Circular WQB-7, January 2004

75% tile pH = **8.3** s.u. Temp = **6.4** deg C

**1-hour average concentration (acute criterion):**

Where salmonid fish are present, CMC = **3.15**

Where salmonid fish are not present, CMC = **4.71**

**30-day average concentration (chronic criterion):**

Where fish early life stages are present, CCC= **1.52**

Where fish early life stages are absent, CCC= **2.47**

**4-day average concentration:**

Where fish early life stages are present, CCC= **3.8**

Where fish early life stages are absent, CCC= **6.17**

Appendix II(B). Reasonable Potential and Proposed effluent Limits, November through March

Parameter, units	Reasonable Potential			Proposed Limits		
	Projected RWC Concentration	Applicable WQS (Y/N)	Exceeds WQS	Maximum Daily Limit	Average Monthly Limit	Allocated Load lbs/day
<b>Physical/ Descriptive Measurements</b>						
Temperature, F, Winter	27	40	N			
Discharge, instantaneous, cfs	14	20	N			
pH, minimum, field, standard units	5.59	6.7	N			
Suspended sediment, mg/L	15	25	N			
Hardness, mg/L as CaCO3	124	NA	N			
Total Residual Chlorine, mg/l	0.0093	0.011	N	0.011		
<b>Organics -Aggregate</b>						
Carb. Biochemical Oxygen Demand, mg/L	UK	NA	UK			
<b>Inorganic, Nonmetallic</b>						
Ammonia, mg/L, as N, Chronic	2.67	1.520	Y		1.5	
Ammonia, mg/L, as N, Acute	2.67	3.150	N	3.2		
Nitrite plus nitrate, mg/L, as N	10.0	10	N			
Total Nitrogen, mg/L	13.96	NA	N			
Total Phosphorus, mg/L	2.30	NA	N			
<b>Metals, Total Recoverable, unless specified</b>						
Arsenic, mg/L	<	0.0021	0.0180	UK	Insufficient data to determine reasonable potential for those metals listed	
Cadmium, mg/L	<	0.0001	0.00041	UK		
Chromium, total, mg/L	<	0.0007	0.139	UK		
Copper, mg/L		0.0007	0.015	UK		
Lead, mg/L,	<	0.0021	0.0067	UK		
Mercury, mg/L		UK	0.00005	UK		
Nickel, mg/L	<	0.0138	0.085	UK		
Selenium, mg/L	<	0.0007	0.005	UK		
Silver, mg/L		0.0021	0.011	UK		
Zinc, mg/L		0.0069	0.197	UK		

(NA-Not Applicable; ND-No Data; UK-Unknown or cannot be determined)

Appendix III(A), Receiving Water Characterization, April through October

Parameter, units		Receiving Water					Water Quality Standard
	<	Mean		Minimum		Maximum	
Physcial/ Descriptive Measurements							
Temperature, F,Degrees	543	50.3		34.7		64.4	+1,-2
Discharge, instantaneous, cfs		25		26		124	
pH, minimum, field, standard units	455	8.1		7.2		9	0
Hardness, mg/L as CaCO3	11	180		102		232	
Total Residual Chlorine, mg/l	1	0		0		0	0.011
Inorganic, Nonmetallic							
Ammonia, mg/L, as N, chronic	702	0.04		0.011		0.35	1.52
Ammonia, mg/L, as N, acute		0.04		0.011		0.35	3.15
Nitrite plus nitrate, mg/L, as N	2	0.38		0.31		0.45	10
Total Nitrogen, mg/L	1	0.71					NA
Total Phosphorus, mg/L	1	0.038					NA
Metals, Total Recoverable, unless specified							
Arsenic, mg/L	<	0.003					0.018
Cadmium, mg/L	<	0.0001					0.00042
Chromium, total, mg/L	<	0.001					0.139
Copper, mg/L	<	0.001					0.015
Lead, mg/L,	<	0.003					0.0067
Mercury, mg/L	<	0.001					0.00005
Nickel, mg/L	<	0.02					0.086
Selenium, mg/L	<	0.001					0.005
Silver, mg/L		0.003					0.011
Zinc, mg/L	<	0.01					0.197

(NA-Not Applicable; ND-No Data; UK-Unknown or cannot be determined)

Ammonia std

**Freshwater Aquatic Life Standards for Total Ammonia Nitrogen in mg/L**

From Circular WQB-7, January 2004

75% tilepH = **8.3** s.u.

Temp = **13**

**1-hour average concentration (acute criterion):**

Where salmonid fish are present, CMC = **3.15**

Where salmonid fish are not present, CMC = **4.71**

**30-day average concentration (chronic criterion):**

Where fish early life stages are present, CCC= **1.52**

Where fish early life stages are absent, CCC= **2.47**

**4-day average concentration:**

Where fish early life stages are present, CCC= **3.8**

Where fish early life stages are absent, CCC= **6.17**



### Appendix III(B), Reasonable Potential and Proposed Limits, April through October

Parameter, units	Reasonable Potential				Proposed Limits	
		Projected RWC Concentration	Applicable WQS (Y/N)	Exceeds WQS	Maximum Daily Limit	Average Monthly Limit
<b>Physical/ Descriptive Measurements</b>						
Temperature, F, Winter		37	52	N		
Discharge, instantaneous, cfs		34.00	34	N		
pH, minimum, field, standard units		6.0	6.7	N		
Suspended sediment, mg/L		13	25	N		
Hardness, mg/L as CaCO <sub>3</sub>		132	NA	N		
Total Residual Chlorine, mg/l		0.0079	0.011	N	0.011	
<b>Inorganic, Nonmetallic</b>						
Ammonia, mg/L, as N, Chronic		3.17	1.52	Y		1.5
Ammonia, mg/L, as N, Acute		3.17	3.15	N	3.2	
Nitrite plus nitrate, mg/L, as N		8.62	10.00	N		
Total Nitrogen, mg/L		11.79	NA	N		
Total Phosphorus, mg/L		1.97	NA	N		
<b>Metals, Total Recoverable, unless specified</b>						
Arsenic, mg/L	<	0.0010	0.018	UK	Insufficient data to determine reasonable potential	
Cadmium, mg/L	<	0.00	0.00042	UK		
Chromium, total, mg/L	<	0.00	0.139	UK		
Copper, mg/L		0.00	0.015	UK		
Lead, mg/L,		0.0022	0.0067	UK		
Mercury, mg/L		UK	0.00005	UK		
Nickel, mg/L	<	0.01	0.086	UK		
Selenium, mg/L	<	0.015	0.005	UK		
Zinc, mg/L		0.01	0.197	UK		

(NA-Not Applicable; ND-No Data; UK-Unknown or cannot be determined)